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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/533,560
Filing Date: May 20, 2005
Appellant(s): ZOBL ET AL.

Werner Stemer
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 23 July 2010 appealing from the Office
action mailed 17 July 2009.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 8-12 and 14-16

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the

subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

6,660,420	Yoshida	12-2003
6,517,338	Koga	02-2003
5,733,682	Quadakkers	03-1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 8-12 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida (US Patent 6,660,420) in view of Koga (US Patent 6,517,338) and Quadakkers (US Patent 5,733,682).

Yoshida discloses a method for forming a separator (i.e., an interconnector) for a fuel cell comprising a two step pressing operation. The process includes pressing the powder to a shape similar to a final desired shape to create a preliminary molded member, then further pressing the preliminary molded member to create a molding of the final desired shape (Col 4 lines 12-16). The separator is generally plate-like with a plurality of knob like protrusions (See Fig. 1). While the angle of inclination is not specifically given, it appears from the drawings to be approximately 90° (see Figs. 3, 4B

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and 6). Yoshida further discloses that the dimensions of the preliminary molded member in the direction of the molding pressure (i.e., the height of the knobs) are about 1 to 2 times the dimensions of the final molded member.

Yoshida does not disclose that in the second pressing steps the angle of inclination is increased to between 95° and 170° .

Koga teaches a method of pressing a powder into a desired shape using a set of molding dies to create a fuel cell separator having a number of protrusions extending from the base plate of the separator. Koga discloses that the dies include holes used to form the protrusions which could have an inside wall that is not perpendicular to the other surface, but is instead inclined at a given angle so that the diameter of a protrusion would decrease as it moved away from the base plate (Col 5 lines 7-21). The angle of inclination formed between the base plate and the protrusion is stated as preferably being between 91° and 100° (Col 5 lines 14-15), and appears to be approximately 105° in Fig. 6, however Koga further notes that inclined walls of the die need only to have a inclined (i.e., not perpendicular) inside wall, and that any inclination or shape (i.e., the walls do not need to be linear) would work (Col 5 lines 18-21).

Yoshida and Koga do not disclose that the powder used be selected from the group consisting of metallic and ceramic materials, and specifically be an alloy having at least 20 wt% of chromium (Cr) component (claim 13), or that the alloy contain Cr, iron (Fe) and one or more metallic or ceramic alloy of at most 40 wt%.

Quadakkers discloses a bipolar plate (i.e., interconnector or separator) for a fuel cell and a metal and ceramic composition of the same which must be sintered to obtain

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the final product. One composition specifically disclosed by Quadakkers include (all percentages given are based on weight) 20% Cr, 5% aluminum (Al), 0.5% Yttrium Oxide (Y_2O_3), balance (74,5%) Fe, this composition is said to have superior corrosion resistance (Col 2 lines 1-3, 13-14, see also claim 6).

It would have been obvious to one of ordinary skill in the art, at the time of invention by applicant, to have modified the method of forming a fuel cell separator by a two step pressing process as taught by Yoshida with the second pressing step reducing oversized knobs down to a final desired size with the fuel cell separator pressing process taught by Koga where the angle of inclination between the base plate and the knob-like protrusion is greater than 90° during the pressing step reducing the powder to a near net final shape, since Koga discloses that having such an angle makes it easier to release the pressed piece from the die (Col 5 lines 20-21).

It would have been further obvious to one of ordinary skill in the art at the time of invention by applicant to use the composition taught by Quadakkers and discussed above in the process of Yoshinda and Koga since Quadakkers discloses that such a composition is effective as a fuel cell separator and creates a separator with increased corrosion resistance. One would have been motivated to do so since all three references are directed toward an interconnector of a fuel cell, and Yoshida and Koga discuss the advantages of using near final shape press molding to create the interconnector, while Quadakkers discloses the advantages of using the material discussed above in creating such an interconnector.

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Referring more specifically to the limitations in claim 11, Yoshida and Koga do not specifically disclose that the angle of inclination between the base plate and the knob-protrusions after the first pressing be between 110° and 130° , and be increased by the second pressing to between 115° and 160° . However, it would have been obvious to one of ordinary skill in the art at the time of invention by applicant that the angle of inclination taught by Koga, as discussed above, could include angles in both of those ranges. It would have been obvious that the angle of inclination should be greater than 90° during both the first and second pressing operations in order to obtain the benefit disclosed by Koga of allowing for easier release from the molds. It would have been further obvious that the angle be increased in the second pressing step since that would be the most obvious method of ensuring that the protrusion was uniformly subjected to the pressing force of the second step to result in a further pressed piece as taught by Yoshida, while still allowing for the increased ease of removal as taught by Koga.

Referring to claim 12, Yoshida and Koga do not specifically disclose a pre-sintering step after the first pressing stage. It is well known in the art that when a powder is pressed which include known additives to assist in forming the mold (such as a binder or lubricant), that these materials should be burned off prior to sintering by heating the molding to a temperature which those additives volatilize and are thus removed from the molded piece. It would have been obvious to one of ordinary skill in the art at the time of invention by applicant that when a powder which uses additives is used to form the molding, that a pre-sintering step be used to remove those additives after the piece is molded and before the piece is finally sintered.

Referring to claim 15, Yoshida, Koga and Quadakkers are relied upon as discussed above, further they all discuss where the molding produced is an interconnector or separator for a fuel cell.

(10) Response to Argument

Applicant argues that one of ordinary skill in the art would not have been motivated to combine Yoshida and Koga with Quadakkers since Yoshida and Koga both use a graphite powder which is pressed with a thermosetting resin (which is easy to press and does not require sintering), while Quadakkers uses a metallic powder (which is difficult to press and requires sintering).

However, one of ordinary skill in the art would have recognized that Yoshida, Koga and Quadakkers were all directed to a method of making a fuel cell separator or interconnector from a powder material. One of ordinary skill in the art, given the teachings of these references, would understand the different advantages and disadvantages of each powder (such as the force required for pressing, or if after forming the body would need to be sintered) and be able to adjust the process in order to take these factors into account.

Applicant further argues that one of ordinary skill in the art would not have combined the cited references because Quadakkers discloses that when powder is used metal injection molding (MIM) or wet powder pouring (WPP) were the only methods available to one of ordinary skill in the art.

This is not what Quadakkers says however. Quadakkers states that piece may be made “by a process yielding a shape close to the final form (near-net-shape-

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processing) by powder metallurgical methods (MIM, WPP)” (Col 3 lines 36-38). Here Quadakkers clearly states that the piece may be made by powder metallurgical methods, and gives as examples MIM and WPP. At no point does Quadakkers say that those are the only two powder metallurgical methods available or that other methods would not be suitable. Therefore, one of ordinary skill in the art would have found it obvious to use the powder of Quadakkers in other powder forming methods, such as those in Yoshida and Koga.

Applicants argue that the prior art does not suggest the claimed two step-pressing operation including an increase in the angle of inclination.

This is not found to be persuasive because, as discussed above, Yoshida discloses a two step pressing operation, and that one of ordinary skill in the art would have found it obvious to modify this by using the increased inclination angle as taught by Koga to allow for easier release of the molded body during all stages of processing. It would have been further obvious that the angle be increased in the second pressing step since that would be the most obvious method of ensuring that the protrusion was uniformly subjected to the pressing force of the second step to result in a further pressed piece as taught by Yoshida, while still allowing for the increased ease of removal as taught by Koga.

Applicants again argue the points of the previous filed Sigl declaration, stating that the opinions provided by an expert must be accepted as facts or in lieu of facts.

Although factual evidence is preferable to opinion testimony, such testimony is entitled to consideration and some weight so long as the opinion is not on the ultimate

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legal conclusion at issue. While an opinion as to a legal conclusion is not entitled to any weight, the underlying basis for the opinion may be persuasive. *In re Chilowsky*, 306 F.2d 908, 134 USPQ 515 (CCPA 1962). Thus, Dr. Sigl's opinions on what one skilled in the art would or would not find obvious is not entitled to weight since it is drawn to the ultimate legal conclusion, however any facts which are used to form the basis of such opinion may have some probative value.

In item 12, Dr. Sigl opines that those skilled in the art had available to them only MIM and WPP as the available processes for molding Cr alloy powders to near-final shape. However, this opinion does not appear to be supported by facts in the record. Quadackers states that Cr alloy powders may be molded to near final shape by powder metallurgical methods, and gives as examples MIM and WPP. However, there is no reason or explanation why this citing of exemplary methods would lead one skilled in the art away from other known powder metallurgy methods, such as pressing. Since there does not appear to be any factual basis underlying Dr. Sigl's opinion of what one skilled in the art would find obvious, this is not found to be persuasive to overcome the above rejection.

Dr Sigl also discusses (items 14-16) that one skilled in the art of powder metallurgy would not have used a pressing method (which he admits was a known powder metallurgy method) based on DIN 30910 detailing difficulty pressing iron-based stainless steels with a Cr content of 16-19 mass%.

However, there is no explanation of why this should be considered relevant to the current inquiry, as it does not appear to be commensurate in scope with the current

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claims. Dr. Sigl discusses specifically stainless steel with a Cr content of 16-19%, while the current claims (and the composition of Quadackers) are directed to metal powders having a Cr content of over 20%. It is also not addressed if there are any other differences between that of DIN 30910 and the current invention (and the composition of Quadackers) that may result in expected differences from DIN 30910.

Thus, when given the proper weight, the declaration of Dr. Sigl is not found to be persuasive to overcome the *prime facie* case of obviousness set forth above.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Russell J Kemmerle/

Examiner, Art Unit 1791

Conferees:

/Matthew J. Daniels/

Supervisory Patent Examiner, Art Unit 1741

/Christopher A. Fiorilla/

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